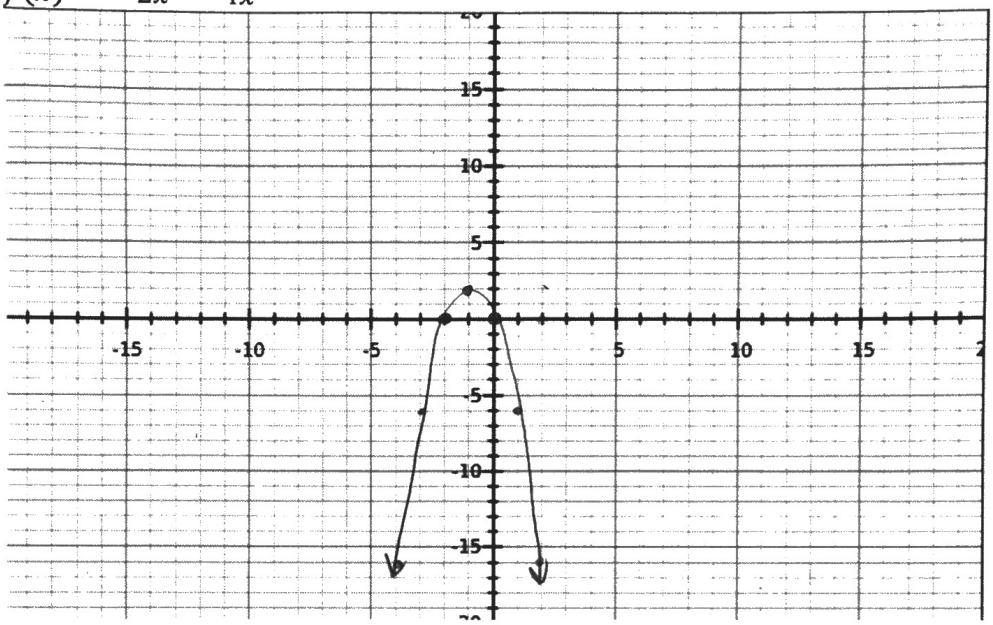
Algebra 2H
Quadratics Unit Test 2017 – 2018 REVIEW

Name: _____
Date: _____

1) Graph and find each of these characteristics for each parabola.
direction it opens root(s) y-intercept vertex

a. $f(x) = -2x^2 - 4x$

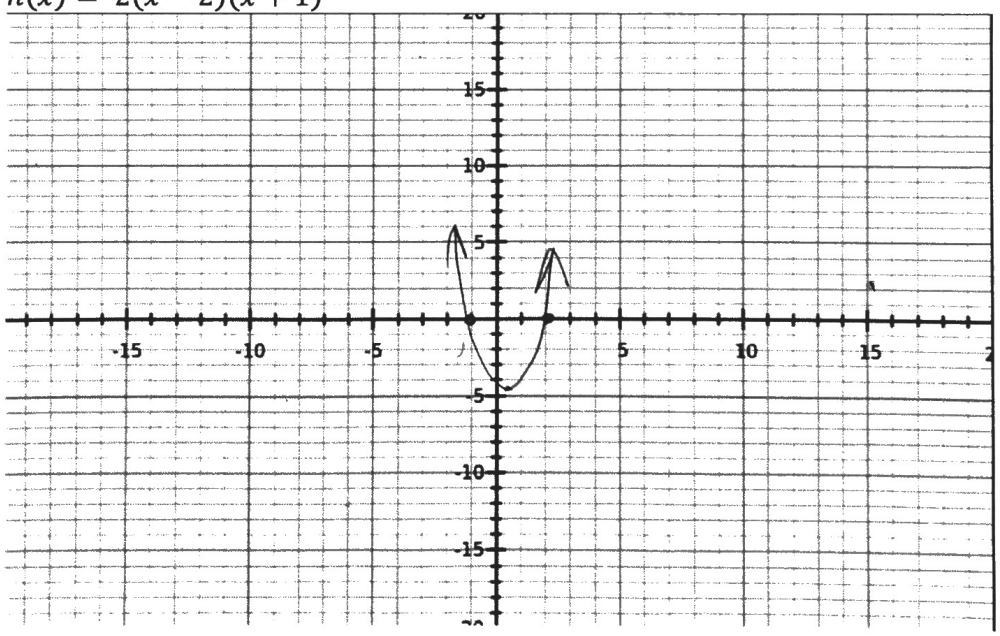


$-2x^2 - 4x = 0$

$-2x(x+2) = 0$

$x = 0, -2$

b. $h(x) = 2(x-2)(x+1)$



$2(\frac{1}{2} - 2)(\frac{1}{2} + 1)$

$2(-\frac{3}{2})(\frac{3}{2})$

$2(-\frac{9}{4})$

$-\frac{9}{2}$

Vertex
$(\frac{1}{2}, -4\frac{1}{2})$

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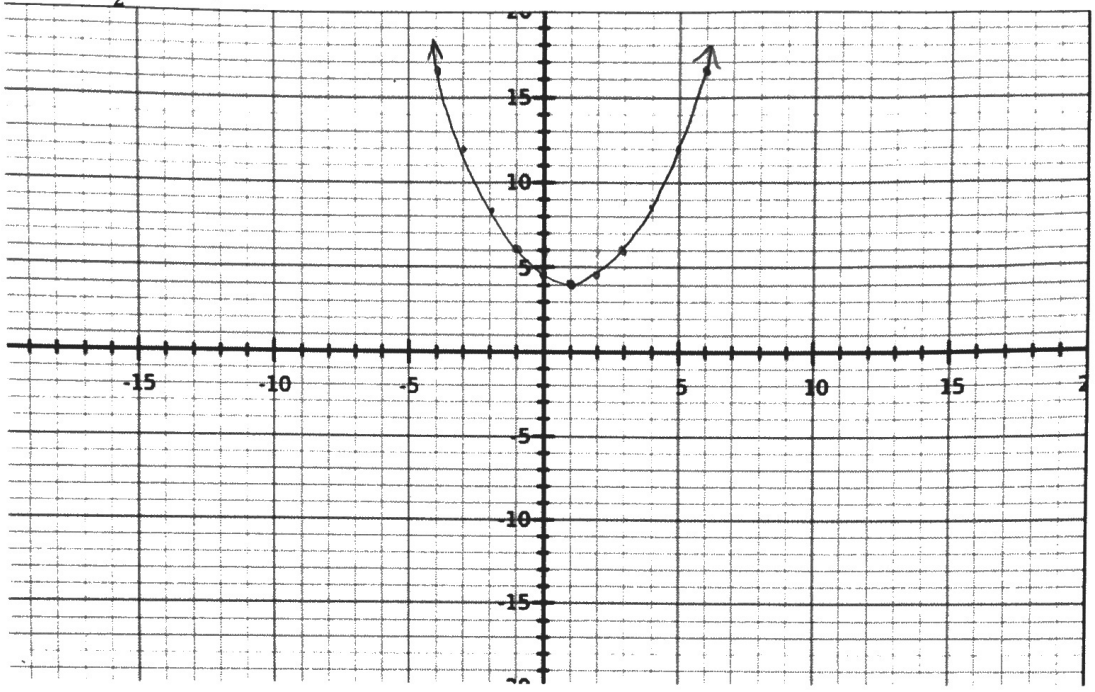
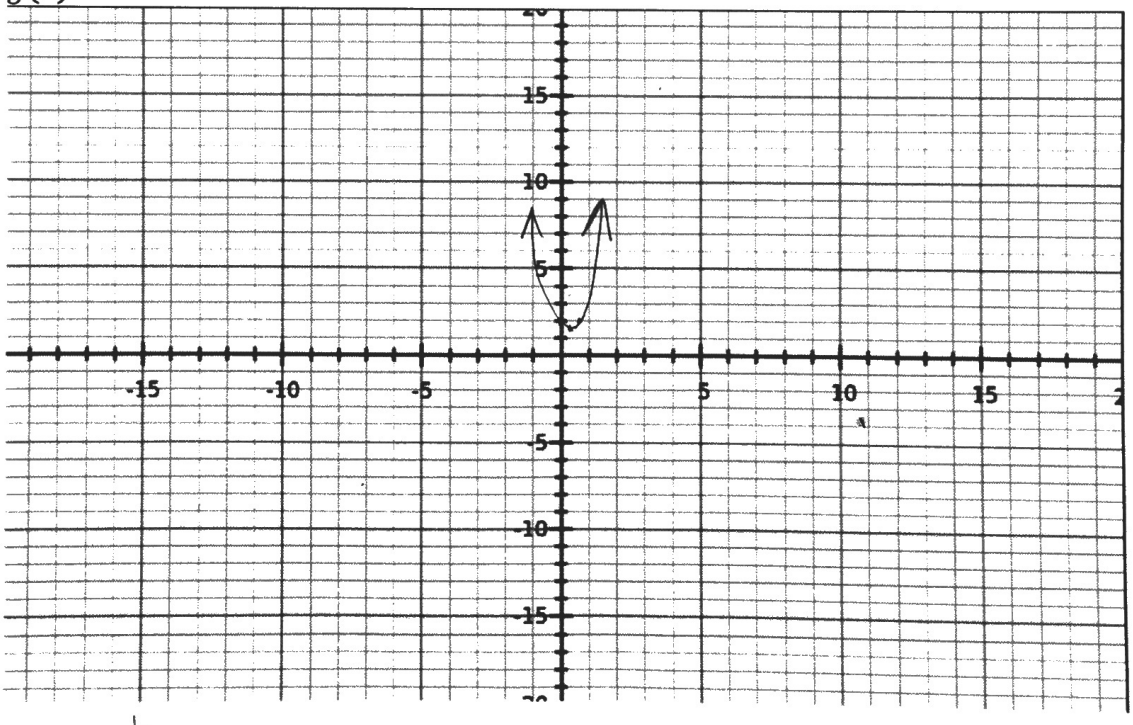
c. $p(x) = \frac{1}{2}(x-1)^2 + 4$



d. $g(x) = 3x^2 - 2x + 2$



Vertex: $x = \frac{-b}{2a}$

$x = \frac{2}{6}$

$x = \frac{1}{3}$

$y = 1\frac{2}{3}$

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2) Justin is hitting baseballs. When he tosses the ball into the air, his hand is 5 feet above the ground. The height of the ball is given by the formula $h(t_j) = -16t^2 + 25t + 5$, where h is the height at t seconds. (The j is for Justin. It is not the base of a logarithm.)

a. He hits the ball when it falls back to a height of 4 feet. After how many seconds will the ball be at 4 feet?

$-16t^2+25t+5=4$

$-16t^2+25t=-1$

$t^2-\frac{25}{16}t=\frac{1}{16}$

$\left(t-\frac{25}{32}\right)^2=\frac{1}{16}+\frac{625}{1024}$

$\left(t-\frac{25}{32}\right)^2=\frac{64}{1024}+\frac{625}{1024}$

$\left(t-\frac{25}{32}\right)^2=\frac{689}{1024}$

$t-\frac{25}{32}=\frac{\pm\sqrt{689}}{32}$

$t=\frac{25\pm\sqrt{689}}{32}$

$t \approx 1.602$ sec

b. After how many seconds will it hit the ground if Justin misses?

$-16t^2+25t+5=0$

$t^2-\frac{25}{16}t=\frac{5}{16}$

$\left(t-\frac{25}{32}\right)^2=\frac{5}{16}+\frac{625}{1024}$

$\left(t-\frac{25}{32}\right)^2=\frac{945}{1024}$

$t-\frac{25}{32}=\frac{\pm\sqrt{945}}{32}$

$t=\frac{25\pm3\sqrt{105}}{32}$

$t \approx 1.742$ sec.

c. Sara is also hitting baseballs. When she tosses the ball in the air, her hand is 4.5 feet off of the ground. The height of her ball is given by the formula $h(t_s) = -16t^2 + 28t + 4.5$. (The s is for Sara. It is not the base of a logarithm.) Will her ball ever get as high as Justin's?

Justin's max height

$x=\frac{-b}{2a}$

$x=\frac{25}{32}$

$y=14\frac{49}{64}$ ft

Sara's max height

$x=\frac{28}{32}$

$x=16\frac{3}{4}$ ft.

Sara's ball will go higher.

d. If both Justin and Sara miss, whose ball will hit the ground first?

Justin's ball will hit the ground in 1.742 sec.

Sara's: $-16t^2+28t+4.5=0$

$t^2-\frac{28}{16}t=\frac{-4.5}{16}$

$\left(t-\frac{7}{8}\right)^2=\frac{-4.5}{16}+\frac{49}{64}$

$\left(t-\frac{7}{8}\right)^2=\frac{31}{64}$

$t-\frac{7}{8}=\frac{\pm\sqrt{31}}{8}$

Sara's will hit the ground in 1.898sec.

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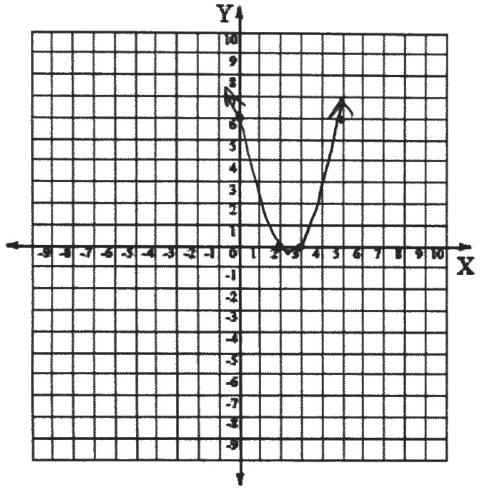
3) Write the equation of a parabola in vertex form, standard form, and factored form (if possible) that has a maximum value of 8 *AND* a y-intercept at (0, 6).

a is negative
$c = 6$
$k = 8$

$y = a(x-h)^2 + k$
$6 = -a(0-h)^2 + 8$
$6 = -\frac{1}{2}(0-h)^2 + 8$

4) Graph the parabola of $y = x^2 - 5x + 6$. (2pts)



$x^2 - 5x + 6$
$(x-2)(x-3)$
Vertex $(2\frac{1}{2}, -\frac{1}{4})$

5) Write the equation from problem #4 in vertex form. (1pt)

$y = (x - 2\frac{1}{2})^2 - \frac{1}{4}$

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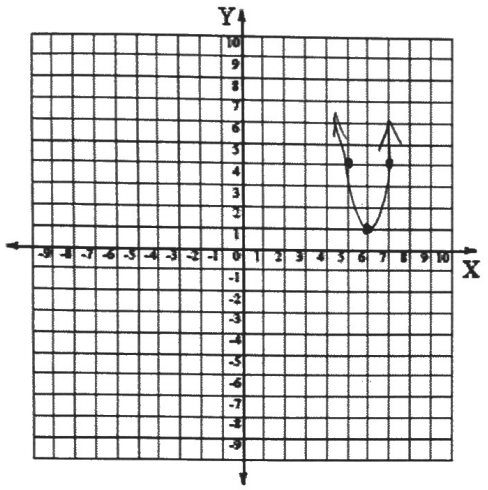
6) Graph the parabola of $y = 3(x-6)^2 + 1$. (2pts).



7) Write the equation from problem #6 in standard form (1pt.)

$y = 3x^2 - 36x + 109$ $\quad 3(x-6)(x-6)+1$

Solve each equation. Leave all square roots in simplest radical form.

8) $7x^2 = 252$

$x^2 = 36$

$x = 6$ or -6

9) $2x^2 + 8x - 20 = 5x$

$2x^2 + 3x = 20$

$x^2 + \frac{3}{2}x = 10$

$(x + \frac{3}{4})^2 = 10 + \frac{9}{16}$

$(x + \frac{3}{4}) = \frac{13}{4}$ or $\frac{-13}{4}$

$x = \frac{5}{2}$ or -4

10) $2x^2 + 4x + 3 = 0$

$x^2 + 2x = -\frac{3}{2}$

$(x+1)^2 = -\frac{3}{2} + 1$

$(x+1)^2 = -\frac{1}{2}$

$(x+1)^2 = -\frac{2}{4}$

$x = -1 \pm \frac{i\sqrt{2}}{2}$

$x = -1 \pm \frac{i\sqrt{2}}{2}$

or

$x = \frac{-2 \pm i\sqrt{2}}{2}$

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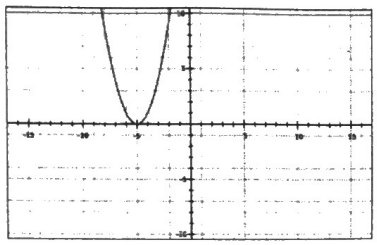
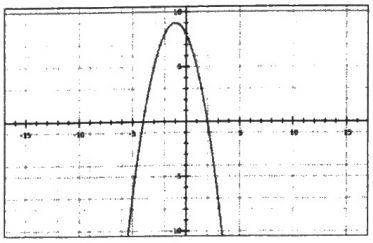
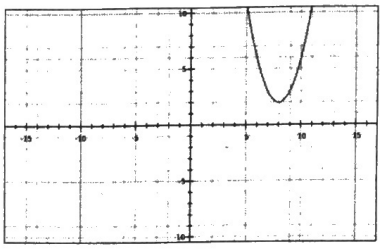
11) For each graph below, describe the discriminant as positive, negative, or zero, and tell how you know this.



Zero
(1 zero)



positive
(2 real zeroes)



negative
(no real zeroes)

12) Which expression shows a correct use of the quadratic formula to solve the equation $2x^2 = 5x - 1$?

a. $\frac{-5\pm\sqrt{25-8}}{4}$

b. $\frac{-5\pm\sqrt{25+8}}{4}$

(c.) $\frac{5\pm\sqrt{25-8}}{4}$

d. $\frac{5\pm\sqrt{25+8}}{4}$

$2x^2 - 5x + 1 = 0$

$x = \frac{5 \pm \sqrt{25 - 4(2)(+1)}}{4}$

13) What are the complex solutions to the following equation?

$\frac{1}{2}x^2 - \frac{1}{2}x + \frac{1}{2} = 0$

a. $5 \pm \frac{\sqrt{3}}{2}$

b. $5 \pm \frac{\sqrt{3i}}{2}$

c. $\frac{1\pm i\sqrt{6}}{2}$

d. $\frac{1\pm\sqrt{3}}{2}$

$2\left(\frac{1}{2}x^2 - \frac{1}{2}x + \frac{1}{2}\right) = 0$

$x^2 - x + 1 = 0$

$\left(x - \frac{1}{2}\right)^2 = -1 + \frac{1}{4}$

$\left(x - \frac{1}{2}\right)^2 = -\frac{3}{4}$

$x = \frac{1 \pm i\sqrt{3}}{2}$

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14) A polynomial is factored completely over the complex numbers.
Two of the factors are $(x - 2i)$ and $(x + 2i)$. Which expression could be the one that was factored?

a. $x^4 - 3x^2 - 4$
b. $x^4 - 5x^2 + 4$
c. $x^4 - 5x^2 - 36$
d. $x^4 - 13x^2 + 36$

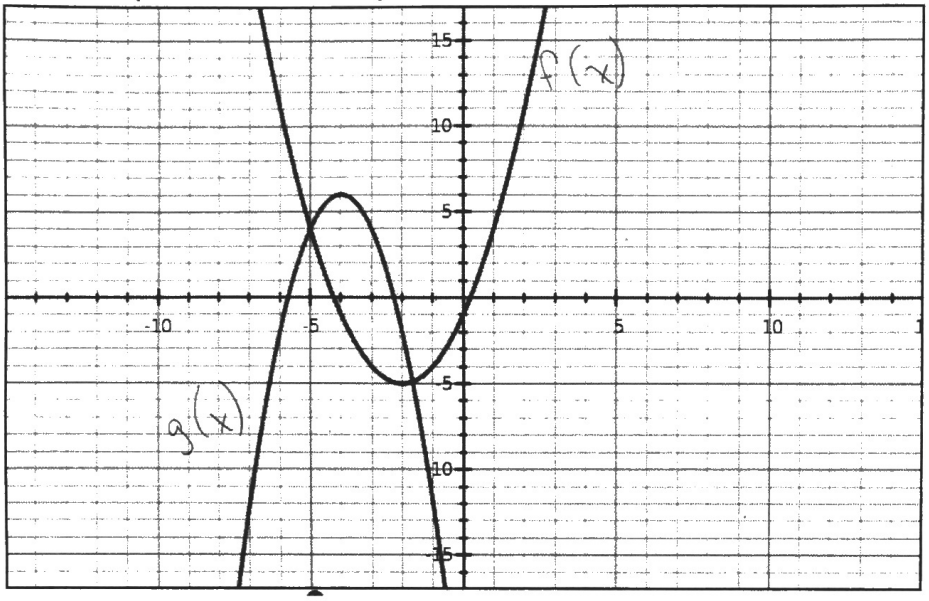
$(x-2i)(x+2i)$

$x^2 - 2i + 2i - 4i^2$

$x^2 + 4$

$(x^2+4)(x^2-9) =$

15) Find the equation of the two quadratic functions below. Write the equations in each form.



$f(x) = a(x-h)^2 + k$

$= a(x+2)^2 - 5$

$f(x) = 1(x+2)^2 - 5$

$f(x) = x^2 + 4x - 1$

$g(x) = a(x+4)^2 + 6$

$g(x) = -2(x+4)^2 + 6$

$g(x) = -2x^2 - 16x - 26$

a. Find the two solutions to the system of quadratic equations shown above.

$x^2 + 4x - 1 = -2x^2 - 16x - 26$

$3x^2 + 20x + 25 = 0$

$3x^2 + 15x + 5x + 25 = 0$

$3x(x+5) + 5(x+5) = 0$

$(3x+5)(x+5) = 0$

$x = -\frac{5}{3}$ or -5

Points

$(-5, 4)$ and $(-\frac{5}{3}, -4\frac{2}{3})$

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16) Find the equation of a quadratic function with zeroes at 4 and -1.

$y = (x-4)(x+1)$

$\boxed{y = x^2 - 3x - 4}$

17) Find the equation of a quadratic function with zeroes at $3 \pm \sqrt{7}$.

$y = (x-3+\sqrt{7})(x-3-\sqrt{7})$

$y = x^2 - 3x - x\sqrt{7} - 3x + 9 + 3\sqrt{7} + x\sqrt{7} - 3\sqrt{7} - 7$

$\boxed{y = x^2 - 6x + 2}$

18) Find the equation of a quadratic function with zeroes at $4i$ and $-4i$.

$(x-4i)(x+4i)$

$x^2 - 16i^2$

$\boxed{y = x^2 + 16}$

19) Find the equation of a quadratic function with zeroes at $5 \pm 2i$.

$y = (x-5+2i)(x-5-2i)$

$y = x^2 - 5x - 2xi - 5x + 25 + 10i + 2xi - 10i + 4i^2$

$y = x^2 - 5x - 5x + 25 - 4$

$\boxed{y = x^2 - 10x + 21}$